

Improved stoves help people's health

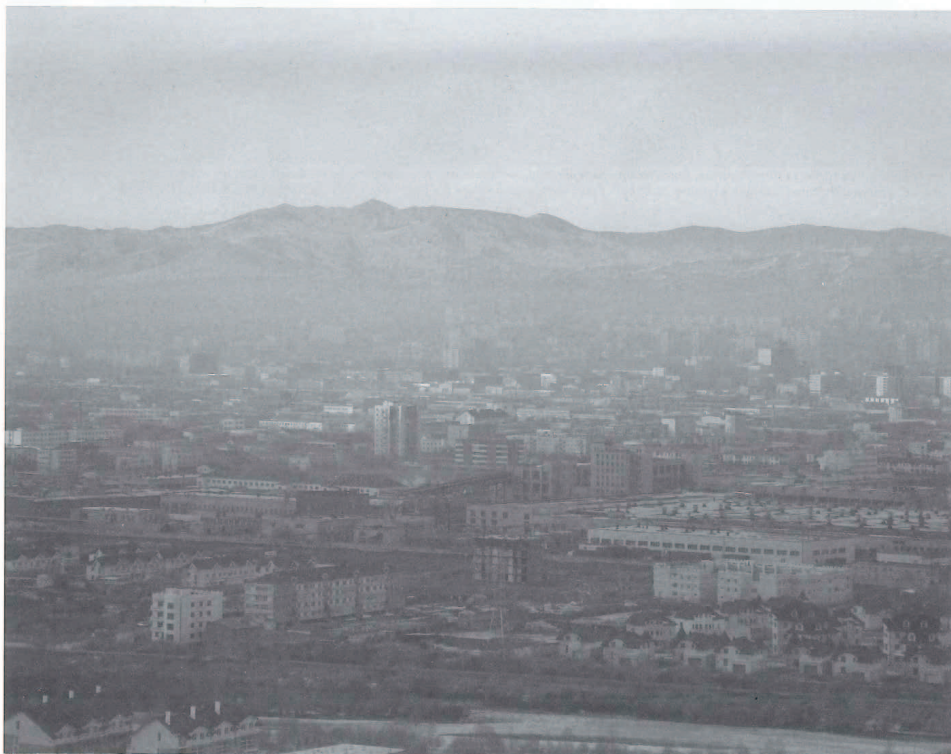
The Mongolian capital Ulaanbaatar is the coldest capital in the world. In such a cold climate heating becomes a question of survival. At the same time, the health of Ulaanbaatar's inhabitants suffers from a thick layer of smog covering the huge ger areas (yurt or traditional dwelling of Mongolian nomads) of the city during the winter season, which lasts from September to May. Ger settlements shelter approximately 700,000 residents living in Mongolian gers or in detached houses. The ger-settlements are neither connected to the central heat energy grid nor to the water and sewage grids.

According to the World Health Organization (WHO), Ulaanbaatar is the second most polluted city in the

world, if particulate matter (PM) is measured (fine particles suspended in the air). The highest emission of PM can be seen during the early morning and evening hours, when families return home, heat their ger and prepare food. It is assumed that annually around 625,000 tons of pit-coal is burnt for heating and cooking in the 140,000 ger households. During the winter season, 85-90 per cent of air pollution through PM is caused by the emissions from heating and cooking stoves. The costs of pollution-related respiratory and cardiovascular ailments are estimated at \$74 million annually. Children, particularly, suffer from respiratory diseases caused by bad indoor and outdoor air quality in the ger districts.

Energy-efficient stoves support ambient air improvement in Ulaanbaatar

The GIZ "Integrated Urban Development Program" supports the Clean Air Department of Ulaanbaatar in improving the air quality of Ulaanbaatar. In order to reach this objective, four ambient air quality monitoring stations have been installed to collect data on air pollution. The air monitoring equipment has clearly defined PM as the main pollutant caused by ger heating and cooking in the winter months between September and May. Moreover, different "generations" of energy efficient and environmentally friendly dual purpose, cooking and heating, stoves for the ger-settlements were developed, tested and introduced to producers and users.



The smoke-dome, mainly caused through heating, covering Ulaanbaatar during wintertime

Credit Ruth Erlbeck

Challenges to improve the traditional stove

GIZ supported the process of developing three generations of stoves, with each step attaining optimum results in terms of fuel consumption, emissions and user preferences.

One underlying idea of the 'GIZ Stoves' was to make use of the commonly used fuel - wood and pit-coal, but with an enhanced combustion-process. The 'GIZ Stove' has an insulated combustion chamber, which is internally lined with fireclay-bricks made out of locally available kaolin from the Gobi Desert. The use of secondary air, which is fresh air injected into the exhaust stream to allow for a fuller combustion of exhaust gases, allows complete combustion which reduces toxic exhaust-gases. The newest generation of stoves has combustion chambers made out of cast iron and lined with fireproof concrete.

The improved stoves have shown that they are efficient at storing heat, improve fuel combustion, and reduce fuel consumption and toxic gases emissions. A team of international and national experts tested the various stoves in the "Stove Emissions and Efficiency Testing Laboratory" financed by ADB in Ulaanbaatar. According to the Testing Protocols, the GTZ 7.5 tested best with regard to all required parameters including efficiency and PM emissions.

Breathing through the chimney of a GTZ 7.5 a person will get cleaner air into the lungs compared to breathing the contaminated air of Ulaanbaatar. The GTZ 7.5 reduces PM emissions by 90 per cent and has an efficiency rate of 90 per cent, reducing fuel consumption by half.

Market conquest

The GTZ 7.5 is highly appreciated by women from the ger districts because of its performance, its design and quality. Despite a variety of proposals for local names, the women of the ger districts insisted in keeping the GTZ 7.5 name because they say it is "guaranteeing German quality". The stove fulfills many of the needs required by Mongolian women from the ger districts such as the dual function of cooking and heating, easy lighting, attractiveness, and insertion of pots according to the Mongolian cooking style. It can also be connected to wall stoves of detached houses. Above all, women do not have to get up at 4 am in the morning to reload it because of its efficiency in retaining heat. The traditional ger stove requires refueling in the early morning.

Comparing costs, a family will need to spend more money as the GTZ 7.5 costs \$150 instead of \$40 to \$50 for a traditional stove. But fuel for the traditional stove will cost a household in the ger settlement around \$500 per heating

season compared to \$270 for the GTZ 7.5 stove.

Spending less on fuel means the new stove is paid off after three months as Tunga, a Mongolian woman in Songinokairkhan District, reports. "I save a lot of money as I only have to buy half the quantity of coal I purchased before. I now pay 39,000 MNT (\$30) per month, before I paid 78,000 MNT per month. But even more important, my small baby was always crying with tears in her eyes when I fired my old stove. Nowadays, with the GTZ 7.5 I can fire the stove and nobody of the family starts coughing or crying. And I also contribute to better air in my district"

Limited production capacities of local producers

There are more than 20 manufacturers of stoves in Ulaanbaatar as well as other metal devices, such as metal fences, gutters, downpipes smoke stacks etc. The GIZ Program has trained 15 metal workers to produce improved heating stoves in 2011. While the majority of them are small enterprises with one to three workers, often only contracted after receiving commissions, there is one big metal producer in Ulaanbaatar.

The quality of the stoves varies with the different producers and the standard is not always stable and reliable, because there is a lack of skilled labour and the equipment in the workshops is outdated. Furthermore, the metal workshops have to rely on other suppliers of components, e.g. for the combustion chamber or the top plate. This means delayed delivery of products and quality fluctuation. Hence, the producer has to bear the risk of borrowing money from banks to purchase the materials.

The GIZ Integrated Urban Development Program has trained Mongolian consultants to take over quality control for a continuous production of improved heating stoves. The potential production in Ulaanbaatar for improved heating stoves is estimated to be 10,000 and 15,000 stoves annually. Up to now, a total of 1,500 GTZ 7.5 stoves have been produced between 2010 and 2012.

In 2011 the "Energy and Environment



A demonstration of the improved heating stove to residents of the ger settlement in Ulaanbaatar

Credit Ruth Erlbeck

Project" of Millennium Challenge Corporation/Millennium Challenge Account (MCC/MCA), financed by the US Government with a grant of \$37.5 million, started to promote improved stoves in the ger settlements. Two stove models, one from Turkey, called "Silver", and the other from China, called "Royal Ocean", are disseminated with subsidies of 70 per cent with an additional subsidy of 20 per cent from the Mongolian Government.

The subsidised stoves, distributed through 45 branches of XAC Banking Ulaanbaatar cost only \$20. So far, over 50,000 "Silver" and "Royal Ocean" stoves have been sold, but some customers had problems inserting pots into the 'Silver' after using it. Furthermore high emission rate have been measured and no verifiable improvement of the air quality in Ulaanbaatar could be identified. Due to these massive subsidies for imported stoves, the local production of improved

heating stoves collapsed.

In response, the metal stove workshops have formed an association of 20 producers to defend their interests and protest against the strategy of importing stoves instead of promoting local production. The Mongolian Government's first reaction was to promote local stove promotion through the newly created "Clean Air Fund", nourished through taxes from exports of coal. This step was highly appreciated by the stove producers as it gave them an incentive to resume local production. Tenders were floated and bidding of local production took place.

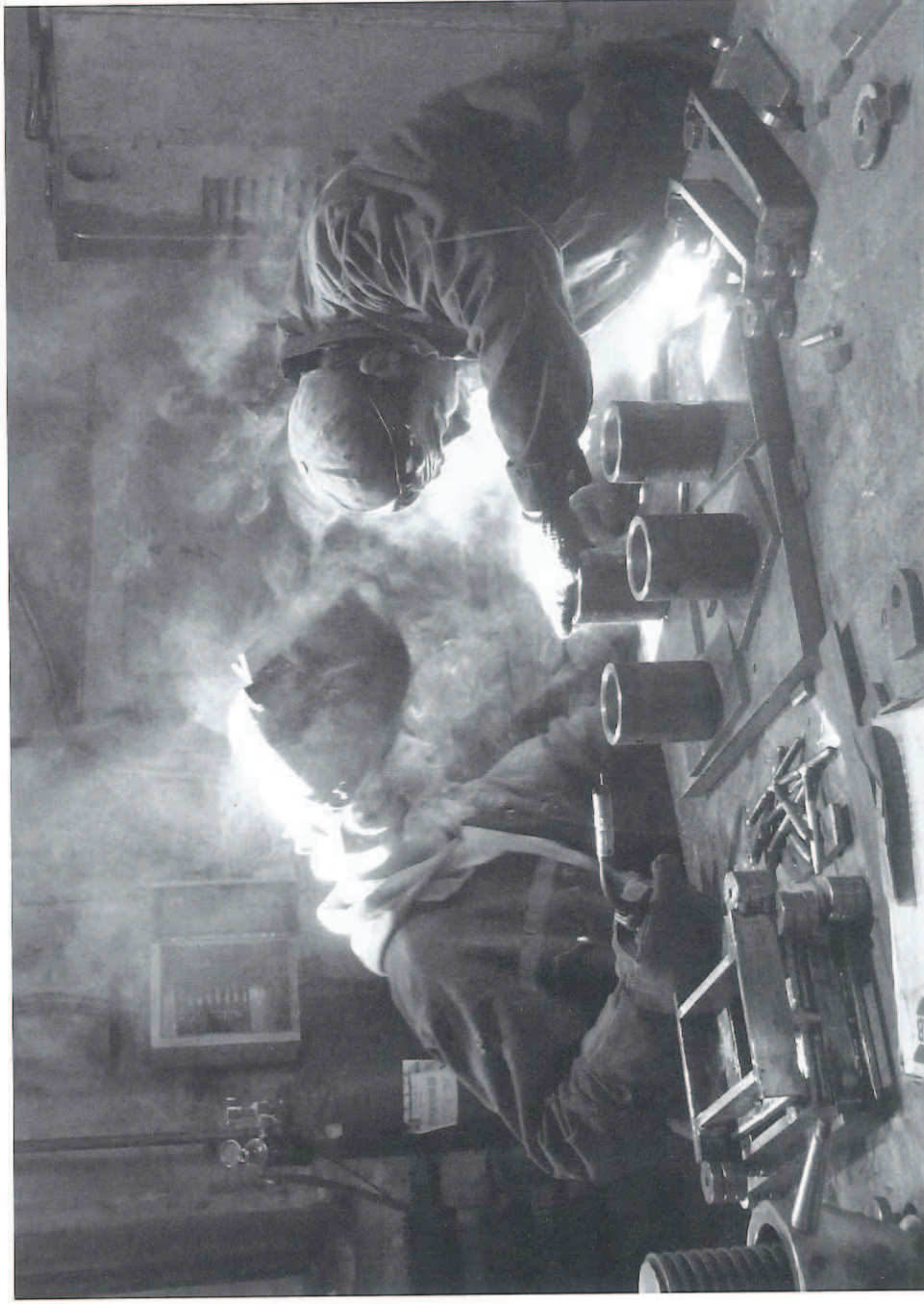
The producer with the GTZ 7.5 won the bid and produced 1000 GTZ 7.5 stoves between January and March 2012. The consumers buying these stoves have to pay \$60 and they can take a loan from XAC Bank with an interest rate of 1.4 per cent per month. The producers' costs of \$150 per stove are reduced by a subsidy of \$100 per

stove from the Clean Air Fund. The remaining amount is paid to the producer by the purchaser or the XACbank.

This is a first step to motivate consumers to purchase locally produced Mongolian stoves. While they are not as highly subsidised as the imported stoves they fulfill the criteria desired by Mongolian women from the ger districts, which is recognised by the rising numbers of daily orders. Currently, the Mongolian Government is considering suspending the value added tax (VAT) of 10 per cent to make local stove production more attractive.

This article was written by Ruth Erlbeck (Program Director) und Ralph Trosse (Technical Manager) of the GIZ "Integrated Urban Development Program" in Mongolia.

More information on improved cooking and/or heating stoves is available from www.giz.de/hera or www.energypedia.info



Welding work for the improved heating stove in the Hasu-Megawatt workshop in Ulaanbaatar

Credit Benjamin Trosse